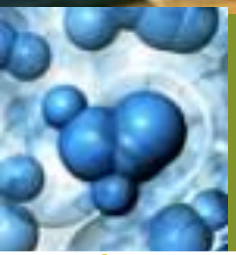






The Center for Identification Technology Research (CITeR)

Presented by Dr. Stephanie Schuckers

February 24, 2011

Clarkson UNIVERSITY defy convention

CITeR Status Report

CITeR is an NSF Industry/University *Cooperative* Research Center (IUCRC)

- **The importance of individual identity in a networked global society**
- **Research cooperatively defined, funded and shared**
- **Scope: Physiological, Behavioral, and Molecular Biometrics**
  - ***2001: WVU Founding Site***, MSU Partner, 5 Founding Affiliates
    - Automated Biometric Recognition
  - ***2006: University of Arizona becomes 2nd Site***, 10+ Universities
    - Credibility, psychophysiological and behavioral deception detection
  - ***2010: Clarkson Plans 3rd Site***, over 20 Affiliates plus 9 Prospective
    - Logical and cyber identity, intelligence

CITeR Cooperative Model

CITeR Current and Committed Affiliates

Clarkson UNIVERSITY

- Accenture
- Booz Allen Hamilton
- Computer Science Corporation
- DIA/DACA-Defense Academy for Credibility Assessment
- Department of Defense—Biometric Task Force
- Department of Defense—DDR&E
- Department of Defense—USSOCOM/SOALT
- Department of Homeland Security—S & T 3 memberships (1 Clarkson)
- BORDERS DHS COE
- Federal Aviation Administration, Information Systems Security (2 memberships)
- Federal Bureau of Investigation
- Irvine Sensors
- Laurea Ltd.
- Lockheed Martin
- National Institute of Standards and Technology (NIST)
- National Security Agency 2 organizations (1 Clarkson)
- Northrop Grumman
- OU Center for Applied Social Research
- Raytheon (2 organizations)
- Morpho Trac Inc.
- Sandia National Labs
- SRC
- Science Applications International Corporation (SAIC)
- US Army Picatinny Arsenal
- US Army CERDEC/SBInet Indep. Test Team
- West Virginia High Technology Consortium Foundation

Booz | Allen | Hamilton

Raytheon

Homeland Security

SAIC

accenture

Federal Aviation Administration

WVHTC FOUNDATION

UNITED STATES SPECIAL OPERATIONS COMMAND

CSC EXPERIENCE. RESULTS.

National Security Agency Central Security Service

LOCKHEED MARTIN We never forget who we're working for

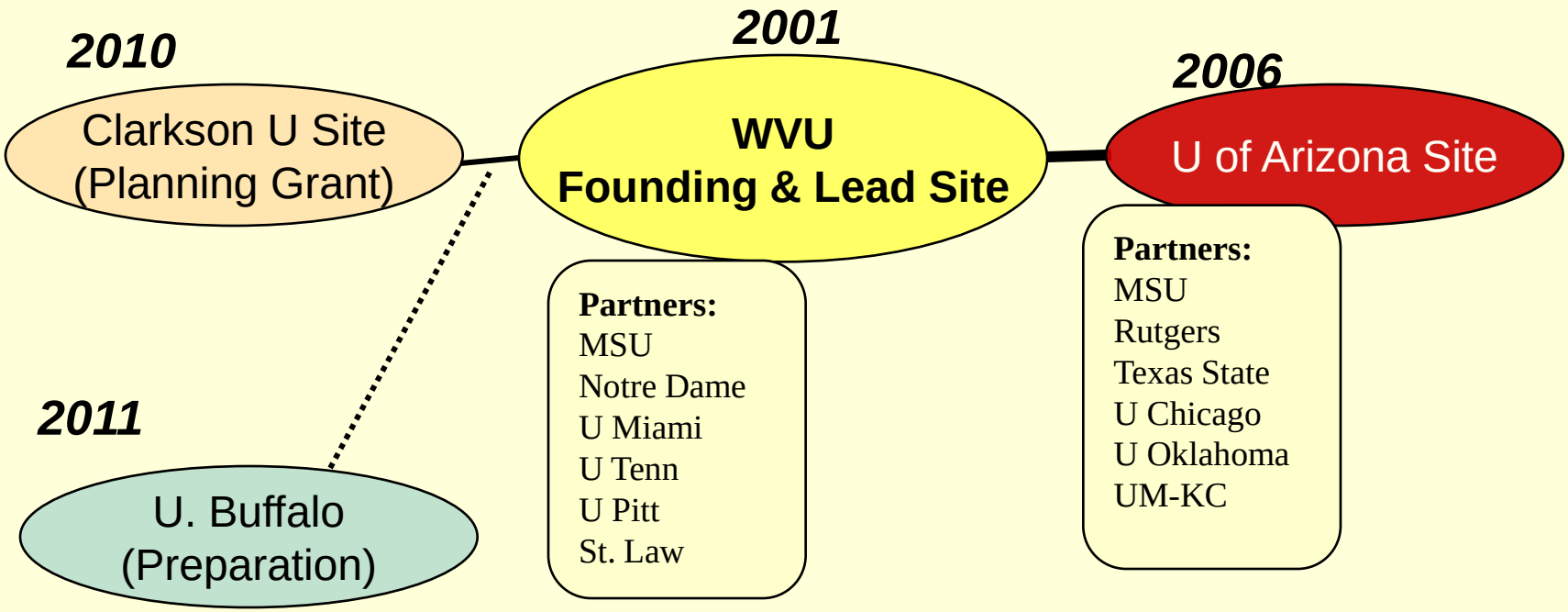
Defense Research & Engineering Innovation, Speed and Agility

MorphoTrak SAFRAN Group

NORTHROP GRUMMAN DEFINING THE FUTURE

Multi-University Trajectory

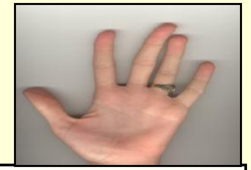
CITeR has grown its participating faculty and university site partners to stay at the leading edge of biometrics & meet affiliate needs.



Prior Research Portfolio Snapshot

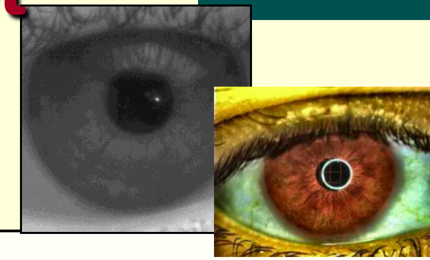
Fingerprint

- Level 3
- Liveness
- Anonymous biometrics
- Biometric cryptosytems
- Quality



Palmprint

- Level 1,2,3
- Partial



Iris

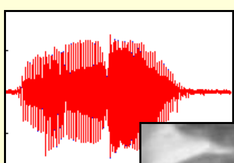
- Non-ideal, off angle
- Unconstrained
- Iris at a distance
- Multispectral
- Quality

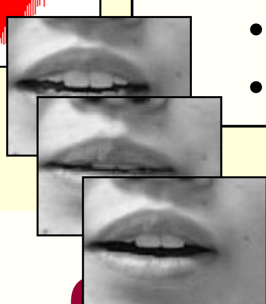
Credibility

- Kinesic
- Audio
- Linguistic

Multimodal

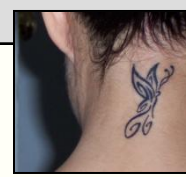
- Fusion score/feature level, quality
- Indexing
- System level design & evaluation
- Sensor networks
- Statistical performance evaluation





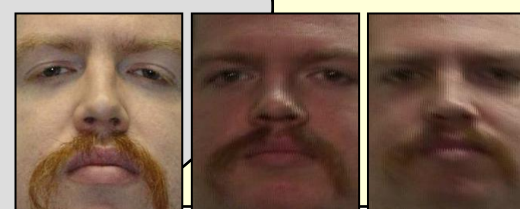
Voice

- Fusion
- Lip



Others

- Gait
- Conjunctival vascular
- Tattoo, body markings
- Soft biometrics
- Age progression



Face

- Matching, quality
- Unconstrained
- 3D Face
- Face in a crowd

Future Research Directions

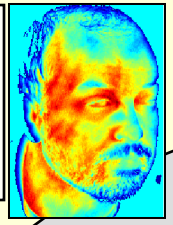
Clarkson UNIVERSITY

Fingerprint

Palmprint

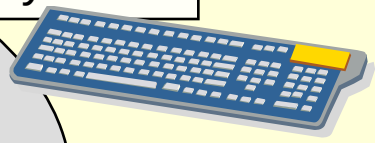
Iris

Trust
- Suspicion
- Health

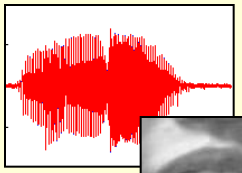


Credibility

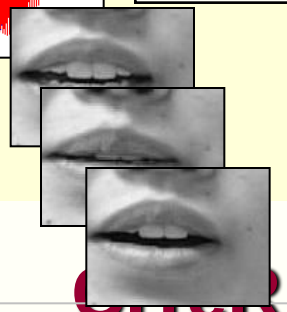
Cyber-Identity
- Logical
- Keystroke



Multimodal
- Non-cooperative, distance biometrics
- Intelligence and biometrics
- Fusion with voice
- Fusion with liveness
- Scalability, individuality

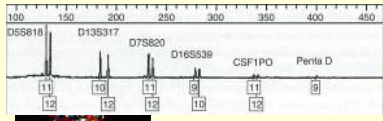


Voice



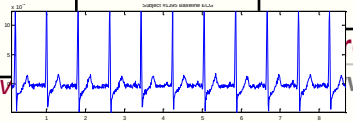
Others

Face



Molecular
- DNA
- VOC

Cardiorespiratory
- Uniqueness
- Distance



Other

Summary of Major Outcomes & Impact

- **Books:**
  Schuckers, Computational Methods in Biometrics: Statistics for Performance Evaluation , Springer, 2010.
  Nelson, America Identified: Society and Biometric Technology,, MIT Press, 2010.
  Maltoni, Maio, Jain, Prabhakar, Handbook of Fingerprints, 2nd Edition, Springer 2009.
  Jain, Flynn, Ross, Handbook of Biometrics, Springer, 2007.
  Ross, Nandakumar, Jain, Handbook of Multibiometrics, Springer Verlag, 2006.
  Li, Jain (Eds.), Handbook of Face Recognition, Springer Verlag, 2005.
- **Public dataset:** Public releases of large multi-modal datasets
- **National Survey Conducted:** Illuminating biometric acceptance in DHS context
- **Software:** MUBI CITeR's multibiometrics fusion analysis and CITeR's PRESS used by DHS, others
- **M1 Leadership in multibiometric fusion**
- **Port-of Entry Study:** Predictive analysis of biometrics, MRTD impact
- **Over 100 publications to date**
- **Over 20 Master's/Ph.D. students graduated to date**
- **Technology transfer:** Fingerprint liveness algorithms, successful small business development funding

CITeR Research Portfolio 2011

- Heterogeneous Face Recognition
- Generalized Additive Models for Biometric Fusion and Covariate Analysis
- Feasibility Study of an International Biometrics Data Portal
- Facial Metrology for Human Classification
- LivDet II Fingerprint Liveness Detection Competition 2011
- Post Mortem Ocular Biometrics Analysis
- A Standardized Framework for a Heterogeneous Sensor Network for Real-Time Fusion & Decision Support
- Comparison of Methods for Identification & Tracking of Facial & Head Features Related to Deception & Hostile Intent
- Establishing Deceptive Behavior Baselines for Eye-Tracking Systems

Research Portfolio 2010

- A Study of MWIR for Face Recognition & Liveness
- Cross-Age Face Recognition Based on a Facial Age Estimation Scheme
- Enhancement & Quality Assessment Schemes for Challenging DNA Analysis
- Optimizing the Design of Large Scale Biometric Security Systems
- Latent Fingerprint Enhancement
- Dyadic Synchrony as a Measure of Trust & Veracity
- Improving Information Security through Authentication Technology
- Temporal Alignment of Psychophysiological Behavioral Indicators
- Non-cooperative Biometrics at a Distance
- Iris Segmentation Quality Analysis: Prediction and Rectification
- Impact on Age & Aging on Iris Recognition
- Multimodal Fusion Vulnerability to Non-Zero Effort (Spoof) Imposters
- Detecting, Restoring & Matching Altered Fingerprints
- SPLICE: Integrating Agent99, LIWC & Building an Accessible
- Identifying Hidden Patterns from Facial Expressions
- Animating the Automated Deception Analysis Machine (ADAM)
- Automatic Deception Systems: To Believe or Not to Believe